

# LOW IMPACT DEVELOPMENT STRATEGIES FOR RURAL COMMUNITIES

John Tippet, Executive Director  
Friends of the Rappahannock, Inc.  
Fredericksburg, Virginia

Neil Weinstein, Executive Director  
Low Impact Development Center  
Beltsville, Maryland

## Abstract

The Friends of the Rappahannock and the Low Impact Development Center, Inc. (both non-profit organizations) developed guidance and strategies for rural communities in Virginia to incorporate LID into their local resource protection and regulatory programs. This project was funded by the National Fish and Wildlife Foundation under a grant from the Chesapeake Bay Program. The town of Warsaw, Virginia is the municipal partner in the grant. The first part of this effort included evaluating state and local codes to determine what, if any necessary legislative, code, or local regulations need to be modified to include LID. Identifying areas that in the Town and land uses that are appropriate for LID technologies follow this effort. The next step was the development of materials for developers and plan reviewers to help guide them through the development process when the use of LID is appropriate. The final step was to design and implement a small demonstration project that showcases LID features, such as raingardens, soil amendments, permeable pavers, and infiltration devices. This paper will document this effort and identify key issues that other communities should consider when considering the use of LID.

## Background

The Town of Warsaw, Virginia is a rural locality in Virginia's Northern Neck, located between the Rappahannock and Potomac Rivers. The Town and County have historically had strong economic ties to the surrounding rivers, although this has declined in recent years due in particular to the decline of oyster harvests. The Town does not have a strong economic base, and recently lost a major employer, a Levi's plant. The Town recently annexed a portion of its "parent" County for the purposes of economic development. This former agricultural land is highly suitable for development, and is situated along the area's major 4-lane highway. The nature of future development in Warsaw is currently unclear, although current trends tend toward assisted living and retirement communities, along with supporting retail services.

Town officials expressed an interest in Low Impact Development strategies after seeing presentations at various local government and watershed management conferences. They were concerned about the stormwater infrastructure costs associated with new development in the annexed land, as well as with the aesthetic and environmental impacts of conventional pond treatment of stormwater runoff. The Town saw LID strategies as a means of reducing costs while also increasing community aesthetics and environmental protection. The Low Impact Development Center, the Friends of the Rappahannock, and the Town of Warsaw teamed up on a joint grant proposal to the EPA Chesapeake Bay Program (through the national Fish and Wildlife Foundation) to develop a model approach for incorporating LID in rural communities.

## Evaluation of Local Codes

The project initiated with an evaluation of local (Town and County) codes and ordinances to determine compatibility with LID. Most local governments, especially rural ones, reference the State BMP design

manual and Stormwater handbooks for guidance. A review of the local and state guidance indicated that the codes allowed the use of many (though not all) types of LID stormwater management practices. However, there were no mechanisms in the language to promote LID designs in lieu of conventional approaches. Additionally, the conventional approach was designed around detention/retention of the 2-year storm, while the LID approach is designed around the replication of pre-development hydrology, which focuses on infiltration of the increase in “initial abstraction” on a site, and maintaining pre-development Time of Concentration.

While practices such as bioretention were permissible in the state guidance, there were other practices without design guidelines or standards by which to calculate pollutant removal or water volume detention. Most notable was the LID practice of “amended soils”. Another deficiency in the stormwater guidance was a table used to determine appropriate BMPs for a site. The guidance recommended using bioretention only on projects with low levels of impervious cover. Another weakness was a specific recommendation against the use of infiltration practices under parking lots, although such practice have a solid track record when correctly engineered.

Project leaders met with Commonwealth of Virginia officials to discuss these barriers. Most were agreed upon for revision in subsequent volumes of the stormwater guidance. On the issue of the conventional vs. LID approach to SWM design, it was generally agreed that the LID approach meets or exceeds the Commonwealth water quality and quantity requirements, as long as the designs also met the Commonwealth’s provision for having an “adequate receiving channel” (Minimum Standard 19). State officials supported Warsaw’s use of a quantitative LID approach as a “first choice” in site design and stormwater management.

## **Assessing Local Government Needs**

The Town Manager’s interest in LID stemmed from a desire to reduce infrastructure and maintenance costs, to increase community aesthetics, and to reduce impacts to the local aquatic resource. Consequently, the project was designed around developing a plan to institute LID as the standard development approach Town-wide, and possibly to be expanded to the county in which the Town resides.

Project staff conducted meetings with Town and County officials to determine their needs in regard to instituting an LID development program. The issue that emerged in the forefront was the lack of criteria that local government plan reviewers had for assessing an LID site design. There were significant concerns, based on prior experience, that “token LID” plans would be submitted (ie plans that included some LID practices, but did not achieve the quantitative LID goals) and that staff would not have the means by which to evaluate the merits of the plan.

Additionally, there was a concern upon the part of local officials that the development community was unaware of the LID approach to site design and stormwater management, and that it would be difficult to have quality LID plans submitted.

## **Developing an Action Plan**

Based on the evaluation of codes and local government needs, the following action items were developed:

1. Develop policy language for instituting LID as the standard practice for project site design and stormwater management
2. Create easy-to-use LID review guidelines for local plan review staff.
3. Create a reference document for developers to use in designing LID plans.
4. Create an LID educational brochure targeted to citizens.
5. Develop a list of specific recommendations for changes to Commonwealth stormwater design guidelines to better support LID at the local level.

## **Demonstration Project**

A demonstration project to model the LID design approach is planned for a Virginia Department of Transportation (VDOT) Commuter parking lot. A rain garden and pervious pavers are planned for the demonstration. The project is currently pending final engineering through VDOT.

## **Project Products**

The policy language developed for the Town establishes the LID approach as the standard methodology within the jurisdiction for stormwater management methodology for new developments. The language includes references to the LID National Manual for design guidelines, and to other guidance products created under this project. The language is currently under review by the Town and County officials for inclusion in the local stormwater management ordinance.

The guidelines for developers and plan reviewers underwent an iterative process of revision between the project leaders, state stormwater management officials, and town staff. The resulting guidelines are designed to lead a developer with little familiarity of LID through the process of creating a viable LID site design. The goal is the development of a site to mimic pre-development levels of infiltration, runoff, and Time of Concentration. The guidelines include the development of pre-, post- and “LID” curve numbers, and recommended means of accounting for volume storage achieved by practices such as bioretention and amended soils. Also included is a flowchart depicting the LID design process. An option for a hybrid approach (using conventional practices to make up for excess volume not managed by LID practices) is built in to the guidelines, but is discouraged.

## **Project Follow-Through**

The Town recently adopted the language recommended by this project as ordinance. Additionally, a CD has been prepared under separate grant that includes a chronicle of the LID ordinance development process in Warsaw, as well as a full tutorial on LID. For further information, please contact the Friends of the Rappahannock at (540) 373-3448, or [cleanriver@pobox.com](mailto:cleanriver@pobox.com). Selected project products are available on the web at <http://for.communitypoint.org>.

## **Recommendations for LID Master Planning / Ordinance Development in Rural Communities**

In general, the transition to LID design and planning in rural communities is easier than in more developed localities due to the presence of fewer existing stormwater regulations. Larger lot sizes also make LID designs simple and very cost effective. Based on our experience with this project, the authors recommend the following steps as the basis for rural municipalities in pursuing implementation of LID approaches:

### **Ordinance Development**

1. Evaluate local and state codes to ensure that roadblocks do not exist that will interfere with LID design. Query local and state officials as to the permissibility of the suite of LID practices, including the use of “site design” features to minimize, intercept and infiltrate runoff.
2. Establish a clear understanding among local plan review staff of the quantitative differences between LID and conventional stormwater management. The “LID Tutorial & Toolkit” CD prepared by the Friends of the Rappahannock is useful in this regard. (<http://for.communitypoint.org>)
3. Have your local technical staff meet with State stormwater management officials to ensure that the quantitative LID approach will be accepted as a substitute for conventional practices. Identify any additional requirements that must be met.
4. Make information available to the building and development community about LID, its benefits and requirements. (The Friends of the Rappahannock LID brochure and the NAHB LID brochures for municipalities and builders are valuable in this regard. Both are available on the CD referenced above).
5. Establish clear LID plan review guidelines and provide them to the development community months in advance of instituting the ordinance. Solicit and incorporate feedback on the guidance.
6. Conduct separate trainings for local plan review staff and local design engineers in the development and review of LID plans.
7. Along with ordinance adoption, be sure to amend any existing ordinances that provide disincentives or roadblocks to LID.
8. In localities where LID is implemented as an option, consider the implementation of incentives in the codes to promote the use of LID

### **Master Planning**

1. Communities are encouraged to implement LID ordinances jurisdiction-wide. However, localities may wish to set up overlay districts where LID practices or certain hydrologic results are required to a greater extent. These LID planning activities should take place within the context of a Watershed Plan. A Watershed Plan needs to include assessment of the following characteristics in order to be useful in LID planning
  - Mapping of extent and magnitude of streambank erosion
  - Stream bio-monitoring for ecological health
  - Mapping of forested buffers and buffer “disconnects”.
  - GIS categorization/mapping of soils for infiltration rate, and depth to water table.
  - Mapping of current impervious cover and trends.
  - Mapping of areas not served by conventional stormwater management
2. Based on the above parameters, communities can prioritize areas for LID application. For example, if LID is an incentivised option in the codes county wide, the jurisdiction may choose to

make it mandatory in catchments where streambank erosion is beyond a certain threshold. Similar parameters for considering more stringent LID overlays include:

- Streams of high water quality and diversity
  - Watersheds with significantly increasing trends in impervious cover
  - Catchments with A & B soils which particularly amenable to infiltration practices
3. LID master plans should be integrated into the jurisdiction's Comprehensive Planning process.
  4. LID Retrofit should be considered as part of any LID master planning approach. While LID practices on new LID developments can only reduce the magnitude of new impacts, LID retrofits have the potential to improve the downstream conditions. It is recommended that GIS techniques be used to prioritize areas for LID retrofit based on soils, current SWM practices, current downstream impacts, and site-specific cost-effectiveness. Contact the Friends of the Rappahannock for example applications of this approach in the Hazel Run Watershed (<http://for.communitypoint.org>)

For Further Information, please contact the authors:

John Tippet, Executive Director  
Friends of the Rappahannock, Inc.  
Fredericksburg, Virginia  
(540) 373-3448  
[cleanriver@pobox.com](mailto:cleanriver@pobox.com)

Neil Weinstein, Executive Director  
Low Impact Development Center  
Beltsville, Maryland  
(301) 982-5559